LX 513 Phonology
Instructor: Professor Trigo

Midterm
Exercise
Hindi, p.175-76 (GP)

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1.a.

Before considering the data, we know that there are two possible treatments of the ~ o alternation:
1. Schwa Deletion:

----------> o / V C _____ C V where C stands for any number of consonants

2. Schwa insertion:

o ----------> / C _____ C

A closer scrutiny of the data reveals that the appearance of o has a much more limited distribution than .

k m r	k mro:	k m rne:
s b k	s bko:	s b kne:
ke:s r	k sro:	ke:s rne:
ka:r k	karko:	ka:r kne:
su:r t	surto:	sur tne:

1.b.

One can easily define the context in which ~ o occurs to be ____ C V, whereas an o ~ alternation occurs between seemingly any two consonants...a rather flimsy rule at best! Schwa insertion, on the other hand, will yield ungrammatical forms such as *surng, pustk, tilsm, kirtn, etc. We can, therefore, safely conclude that the alternation is ----> o/___C V.

1.c.

The data provided in this section poses problem to our formulation of the rule of schwa deletion. Here, our current rule runs into problem because we are presented with three cases in which does not drop in the context

pust k	pust ko:	pust kne:
ki:rt n	ki:rt no:	ki:rt nne:
ks r	ks ro:	ks rne:

We must now adjust our rule to accommodate the new data. The new rule must be stated as follows:

------> o/V C ____ C V (here C stands for a single consonant)

1.d.

In this section we are presented with a controversial aspect of Hindi phonology. According to Bhatia and Kenstowicz (1972), it is not clear "whether aspirated consonants should be treated as clusters of stop + h or as single segments that are [+aspirated]. From the data given we can determine that the cluster Ch is treated as a single segment that is [+aspirated]. Evidence for such a determination is found in the past tense forms of sul jh 'solve', ukh r 'be uprooted', uch l 'jump', and sih r 'feel frigid' in which the ~ o alternation occurs.

sul jh	sul jhna	suljha
ukh r	ukh rna	ukhra
uch l	uch lna	uchla
sih r	sih rna	sihra

Given that ~ o/ V C _____ C V, the absence of is indicative of the fact that Ch clusters are single [+aspirated] segments. However, the data show that we need to rewrite our rule. In the previous sections it seems as if schwa deletion occurs only when the following vowel is long. The data in section 1.d. show that this is not the case. That is, schwa deletes even when the preceding or following vowel is not long. Therefore, we need to include vowel length as an optional requirement. Our rule would be

--------> o/ V (:) C _____ C V (:) (the colon in parentheses means that vowel length is optional and is, therefore, irrelevant for schwa deletion.

1.e.

The problem tells us that Hindi has the following nasal consonants: [m], [n], [ ], [ ], and [n] and that the latter three only appear before homorganic consonants (homorganic meaning that they appear before consonants with the same point of articulation). Could this be an indication of assimilation taking place. In other words, could it be possible that Hindi follows a rule of assimilation that assimilates the aforesaid nasal consonants to that of the following consonant. The answer is a resounding yes. In reality Hindi has two underlying nasal consonants: [m] and [n], the latter assimilates to the following consonants becoming [ ], [ ], and [ ] respectively.

k n	k no:	k nne:
p l g	p l go:	p l gne:
c l	c lo:	c lne:
j n	j no:	j nne:
kh nd	kh ndo:	kh ndne:
nt	c nto:	c ntne:

The nasal consonant is followed by therefore it cannot assimilate to the consonant. It seems reasonable to assume that the three nasal consonants [ ], [ ], and [ ] result from the nasal assimilation. Perhaps, this is the reason why they do not occur elsewhere unless followed by another consonant. A close examination of the data reveals another interesting aspect of Hindi phonology. We are told that there are exceptions to the nasal assimilation rule in Hindi:

s n k	s nko:	s n kne:
k m r	k mro:	k m rne:
c m k	c mka	c mkna

If we look at the data carefully, it becomes clear that it is rather a matter of rule ordering. Recall that we assumed earlier that the underlying form is s n k, k m r, and c m k. Nasal assimilation does not take place because there is a schwa between the two

consonants. In other words, nasal assimilation takes place before schwa deletion. We will therefore state that the rule ordering is the following:
1. Nasal Assimilation
2. Schwa Deletion

1.f.

Section f presents difficulties for our schwa deletion rule. We stated earlier that for deletion it is sufficient for the to be followed by C V. However, we see that schwa is not deleted in the following cases:

a:g n	a:g no:	a:g nne:
a:c l	a:c lo:	a:c lne:
i:dh n	i:dh no:	i:dh nne:
sa:bh r	sa:bh ro:	sa:bh rne:

A common denominator in all these cases is the initial nasal vowel. It appears that schwa is not deleted when it is preceded by a nasalized vowel. In order to embellish our schwa deletion rule, we need to specify that schwa is not deleted when a nasalized vowel precedes it. In other words, we must now formulate our rule stating that the vowel preceding schwa must be oral:

------> o / C V (:) _____ C V (:)
[-nasal]

It should be noted that we are supposed to find an alternative solution. We are told that while there is a distinction between long and short [-nasal] vowels, nasal vowels are long. The data in this section indicates that the long nasal vowels are underlying short vowels followed by nasal consonants (rather, nasal consonant allophones). We are also told that "within a morpheme long oral vowels do not generally appear before a cluster of nasal plus consonant." In other words, only short vowels appear before nasal consonant followed by another consonant. According to the distributional facts of Hindi phonetics, nasal vowels never occur before nasal consonants. There are a few here that we need to consider. It seems to be the case that the nasal vowels are derived from a combination of vowel and nasal consonant. That is, there must be a phonological rule in Hindi that deletes the nasal consonant preceded by a long vowel. We will write the rule as follows:

V: C ----------> V:
[-nasal] [+nasal] [+nasal]

For sake of convenience, we will call this rule vowel nasalization. It is important to mention here that there is a requirement for vowel nasalization to take place; the nasal consonant must be at the end of the syllable. The reason we must state the rule more precisely is that the data in 1.g. does not follow the rule of vowel nasalization. As we will see in our discussion of section 1.g. vowels are followed by nasal consonants, but they do not get nasalized. This is because of the simple fact that the nasal consonants following them do not end the syllable. Our rule now explains why in Hindi nasalized vowels are not followed by a nasal consonant. It should be noted that our nasalization rule is doing two things: it is nasalizing the vowel and deleting the nasal consonants. It is reasonable to assume-based on our discussion so far-that Hindi follows the following rule ordering:
1. Nasal Assimilation
2. Schwa Deletion

3. Vowel Nasalization

1.g.

The data given supports the aforementioned rules. As mentioned in the previous section, our nasalization rule has two properties: it is nasalizing the initial vowel and deleting the nasal consonant. The question is what is happening first. Is the vowel getting nasalized first or the nasal consonant is getting deleted? In order to answer this question, we will have to posit two rules and then give sequence. As stated earlier, the first rule nasalizes the vowel before a nasal consonant. We will call this the vowel nasalization rule:

V: C ----------> V:
[-nasal] [+nasal] [+nasal]

Our second rule then would be the nasal consonant deletion rule. According to this rule, a nasal consonant is deleted whenever it is preceded by a nasal vowel:

C -------> o /V (:) _____
[+nasal] [+nasal]

Now we need to state the sequence in which these two rules apply. A cursory look at the data in section 1.g. reveals that schwa deletion must take place between the two aforesaid rules.

ki:m t	ki:mti:
da:n v	da:nvi:
ka:n n	ka:nni:
la:n t	la:nti:

In all these cases, none of the above rules applies except schwa deletion. An obvious breakdown of the four rules we have stated so far will have the following order:

1. Nasal Assimilation (This rule does not apply here because there are no consecutive homorganic nasal consonants. One seemingly problematic form is 'ka:nni:', but it is not really a problem because if we recall the underlying form 'ka:n n, we will argue that there is a schwa in the underlying form between the two nasal consonants that prevents nasal assimilation.)
2. Vowel Nasalization (This rule does not apply either because as we discussed earlier in section 1.f., the nasal consonant following the vowel does not end the syllable.)
3. Schwa Deletion (It is evident from the data that this rule applies in all cases. The root morphemes 'ki:m t', 'da:n v', ka:n n, and 'la:n t' all undergo schwa deletion, resulting in the following forms 'ki:mti:', 'da:nvi:', 'ka:nni:, and 'la:nti:' respectively.)
4. Nasal Consonant Deletion (It follows from our discussion in section 1.f that vowel nasalization takes place before nasal consonant deletion. The nasal consonant deletion rule does not apply here because the vowels [:] and [a:] preceding the nasal consonants are not nasalized. Therefore, the nasal consonants are not deleted.)